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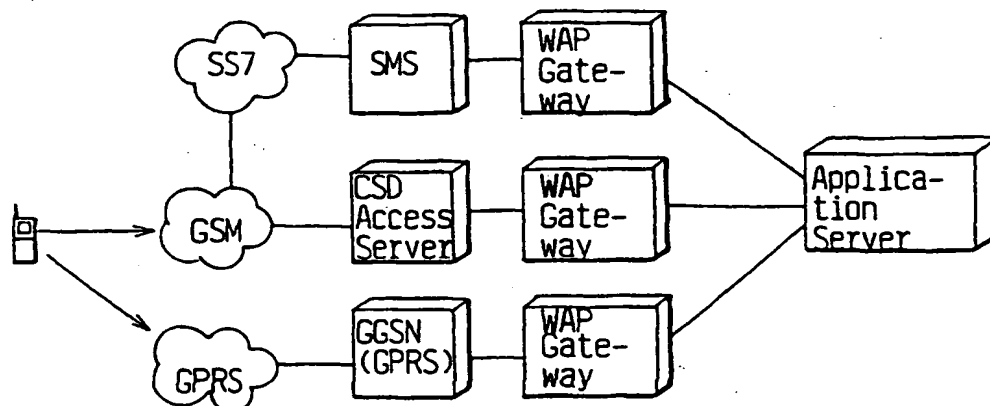
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(54) Title: **MOBILE COMMUNICATION SYSTEM IN WHICH THE INFORMATION CONTENT IS TAILORED DEPENDING ON THE CAPABILITY OF THE BEARER THAT IS USED FOR THE SPECIFIC ACCESS**



(57) Abstract: Communication system comprising a terminal 2, e.g. a mobile phone, adapted to access information in an application server via an access network using an access bearer. The system conveys the capability of the access bearer to the application in order to tailor the information content depending on the capability of the bearer that is used for the specific access.

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MOBILE COMMUNICATION SYSTEM IN WHICH THE INFORMATION CONTENT IS TAILORED DEPENDING
ON THE CAPABILITY OF THE BEARER THAT IS USED FOR THE SPECIFIC ACCESS

Field of the invention

- 5 The present invention relates to a communication system and a method in a communication system according to the preambles of the independent claims.

Background of the invention

- 10 In the mobile Internet world, users may have more than one type of radio access to reach their applications.

- The different radio accesses (access bearers) could be e.g. Short Message Service (SMS), Unstructured Supplemental Service Data (USSD), Circuit Switched Data (CSD) (9.6 Kbps), CSD (14.4 Kbps), General Packet Radio Services (GPRS) (up to 384 Kbps), Universal Mobile Telephone System (UMTS) (up to 2 Mbps) or
15 Bluetooth (short range, high frequency communication protocol).
These bearers have different capabilities in terms of e.g. transmission speed.

Figure 1 illustrates a system according to the state of the art.

- A terminal 2, e.g. a mobile phone, can reach an Application Server via a Wireless
20 Application Protocol (WAP) Gateway and via several types of access technology.
The WAP technologies are e.g. described on <http://www.wapforum.org/>,
(homepage for WAP forum) or <http://www.wapforum.org/what/technical.htm>,
(WAP Specifications).

- 25 Wireless Application Protocol (WAP) is a technology that enables wireless access to Internet applications from a terminal, preferably a mobile phone.
The WAP forum has defined a WAP architecture for pulling (i.e. user initiated) information from Internet (e.g. Internet browsing) and pushing (i.e. application initiated) information (e.g. sending news messages, mail notification).

- 30 Wireless Application Environment (WAE) has adopted a model that closely follows the World Wide Web (WWW) model. All content is specified in formats that are similar to the standard Internet formats. Content is transported using standard protocols in the WWW domain and an optimized HTTP-like protocol in
35 the wireless domain, a WAP communication protocol, preferably the Wireless

Session Protocol (WSP). WAE has borrowed from WWW standards including authorizing and publishing methods wherever possible.

A mobile phone could establish a circuit switched data call in the GSM network or use a packet switched data network like the General Packet Radio Services (GPRS) or the Universal Mobile Telephone System (UMTS) which is the standard for the next generation mobile telephone system in Europe. There is also the possibility to use short-range radio access technology like Bluetooth. As mentioned above figure 1 illustrates a communication system according to the prior art where a mobile telephone 2 may establish connection to an application server via one of many access bearers (e.g. Bluetooth, GSM, GPRS or UMTS), a WAP Gateway and an IP network.

In figure 1 the Application Server is connected to the WAP Gateway via a LAN or via an Internet Protocol network (IP network) and the WAP Gateway may in turn be connected to the mobile phone 2 via a further a IP network. It should be noted that one of the IP networks in figure 1 might be omitted. The protocol used from the WAP Gateway to reach the applications, residing in the Application Server, is HTTP (the HTTP specification is a well-known established standard that is described on <http://www.ietf.org/rfc/rfc2068.txt?number=2068>).

The Application Server does not know what bearer the access was made with which might lead to unacceptable consequences regarding a user's possibility to access certain application information.

For example, if you surf (using SMS bearer) and select a WAP page, that was designed for CSD (9.6 Kbps), could result in that the downloading time for the page will be too long and therefore inconvenient for the end user.

One object of the present invention is to increase and optimize a user's accessibility of application information, inter alia in terms of shorter downloading time.

Another aspect of the present invention will now be discussed with references to figure 2. In an operator mobile network (PLMN) the different access types will co-exists and will be unevenly deployed in one time of point. An operator that have GSM coverage and decides to introduce GPRS will start to do this in selected areas, like for example in cities. The same will be valid when introducing a next

generation mobile system, e.g. UMTS. The reason for gradually introducing the bearers with the higher capacity is related to cost. It is a big investment for the operator to introduce new access bearers.

5 Figure 2 discloses coverage for different radio accesses in a mobile network. Mobile phones may be moved around in the PLMN area and, depending on the radio accesses availability, be able to use different bearers. Another aspect regarding the choice of bearer, except for different downloading times, is related to the different costs for using different bearers. It may be cheaper to use one
10 before another bearer.

A drawback with communication systems used today is that the information about the bearer is not known to the application, e.g. when using WAP. Thus, another object of the present invention is to provide a communication
15 system that overcomes this drawback.

Summary of the invention

The above-mentioned objects are achieved by a communication system and a method in a communication system according to the characterizing portions of
20 the independent claims.

Preferred embodiments are set forth in the dependent claims.

A mobile phone may use different bearers, e.g. GPRS, Circuit Switched Data (CSD) or SMS/USSD (via GSM), and the same bearer may use different
25 transmission speeds depending on for example available channels at the moment. In order for the application to know the capability of the bearer that is used in the radio access the capability must be recognized and forwarded to the application server. This may be done in two ways according to a first and second
30 preferred embodiment of the present invention.

Thus, since information about the capability of the bearer is conveyed to the application, the present invention overcomes the above-mentioned drawbacks by making it possible for an application to tailor the accessed information content depending on the capability of the bearer that is used for the specific access.

In order to provide the user with a valuable service, the application has to adapt to the capability of the bearer that is used for the access. Adaptation can mean that the information formatting is adjusted to the bearer capabilities or even that the information itself is adjusted. An example of the latter case is an application that only sends a summary of world news to a mobile phone rather than extensive articles.

Short description of the appended drawings

Figure 1 illustrates a system according to the state of the art.

10 Figure 2 shows coverage for different radio accesses in a mobile network

Figure 3 shows a first preferred embodiment of the invention.

Figure 4 shows a second preferred embodiment of the invention.

Detailed description of preferred embodiments of the invention

15 The capability of an access bearer includes a parameter regarding the transmission speed used by that bearer. Also other parameters related to the transmission, e.g. bandwidth, may be included in the capability information.

Throughout the application, "terminal" is used to describe a device adapted to initiate an information request to an application server and to receive the requested information. In the description of the preferred embodiment the terminal is exemplified by a mobile phone. However, any device provided with means for generating such an information request may be used as a terminal. Among those may be mentioned a laptop computer, a mobile phone, and all hand-held devices adapted to be wirelessly connected to an application server.

A first preferred embodiment of the invention will now be described in connection with figure 3, where one WAP Gateway 4,6,8 is arranged for each radio access bearer.

30 The embodiment shown in figure 3 discloses three examples of access bearers, each being provided with a WAP Gateway especially designed with regard to the capability for its respective access bearer. In the figure is the Short Message Service (SMS) server connected to the terminal 2 via a Signaling System No. 7 (SS7) (a protocol for signaling) and GSM network in accordance with established technique. The CSD Access Server and the Gateway GPRS Support Node (GGSN)

server are connected to the terminal 2 via a GSM network and a GPRS network, respectively, also in accordance with established technique.

The number of WAP Gateways is naturally not limited to three; instead the number of used WAP Gateways equals the number of different used access bearers.

By having one gateway per access bearer, the different gateways would know the capability of the access bearer it is serving but maybe not the actual used transmission speed, because it may be decided at the phone, if the used bearer are capable of using different speeds.

The terminal initiates a request (WAP request or HTTP request) which is sent to the application via the access bearer and the gateway allocated to the access bearer. When the request passes the gateway, the capability of the access bearer is appended to the request. This could be done, for example, by using a cookie in a header of the request.

Before the capability is appended to the request, if the request was made from a WAP enabled terminal, i.e. was a WAP request, the request in Wireless Session Protocol (WSP) is transformed into an HTTP request. Then, the WAP Gateway appends to the HTTP request the capability of the access bearer in an HTTP header of the HTTP request.

Example of a HTTP header:

Cookie: Access-Bearer-Type="(bearer)".

Where *bearer* is the type of access. For example, SMS, USSD (Unstructured Supplemental Service Data), CSD-9.6, CSD-14.4, GPRS, UMTS or Bluetooth.

The HTTP request is then supplied to the Application Server.

The requested application server is able to extract the Access-Bearer-Type cookie from the HTTP header according to well-known HTTP programming technique. The requested application may then be tailored in response of the received capability of the access bearer in order to achieve an optimized transmission to the terminal requesting the application information.

An alternative embodiment to the above-described first preferred embodiment of the invention is to substitute the WAP gateway with an HTTP proxy server. This would be possible if a terminal (e.g. mobile phone) would use HTTP directly.

- 5 A second preferred embodiment of the invention is described in connection with figure 4.

Figure 4 illustrates components in a terminal that is used when implementing the present invention according to the second preferred embodiment. The terminal comprises a Radio Access Module (RAM), a Bearer Capability Database (BCD) and a WAP User Agent 10.

The Radio Access Module is able to detect the type of bearer that the terminal uses based upon, for example, frequencies and number of time slots in the radio link. This information is continuously interpreted in the RAM. By interpreting used frequency, number of time slots, type of radio channel used, the RAM will calculate used transmission speed, and continuously write it into the memory storage of the Bearer Capability Database (1 in figure 4). At each request, this information in the BCD is appended to the request message (2 in figure 4). If the terminal already is connected to the application server and a change in the capabilities occurs, the terminal is informed and the RAM interprets it and writes it continuously into the BCD. This new information is then appended into the next WAP request (or HTTP request).

The User Agent 10 (defined in the above referenced WAP specification and shown to the left in the figure) comprises a number of protocol layers. An alternative to a WAP user agent would be to directly use an HTTP client in the terminal. The different layers in the WAP User Agent from above are: Wireless Application Environment (WAE), Wireless Session Protocol (WSP), Wireless Transaction Protocol (WTP), Wireless Transport Layer Security (WTLS) and Wireless Datagram Protocol (WDP). When an application request (information request) is initiated the User Agent (or HTTP client) is arranged to make a WAP request (or HTTP request) to an application via the WAP protocol (or HTTP protocol) and the relevant capability of the access bearer is identified in the Bearer Capability Database.

The thus identified capability is then appended to the WAP request (HTTP request) in a WAP header (or HTTP header).

For an example of an HTTP header, see the first preferred embodiment of the invention described above.

A WAP header will have the same look but can be binary encoded.

- 5 When the application server has received the capability of the used bearer, e.g. according to one of the described embodiments, the application is adapted to tailor the application information to be transmitted to the accessing user. This may be performed in many different ways, e.g. the information formatting is adjusted to the bearer capabilities or even that the information itself is adjusted.
- 10 An example of the latter case is an application that only sends a summary of world news to a mobile phone rather than extensive articles. Another example of adjusting the information is to filter out images from a newspaper article and only send the text information.
- 15 The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used. Therefore, the above embodiments should not be taken as limiting the scope of the invention, which is defined by the appending claims.

Claims

1. Communication system comprising a terminal (2), e.g. a mobile phone, adapted to access information in an application server by using an information request conveyed to said application server via an access bearer having a bearer capability, characterized in that said bearer capability of the used access bearer is appended to said information request that is conveyed to the application server.
2. Communication system according to claim 1, characterized in that said information request is a WAP request.
3. Communication system according to claim 1, characterized in that said information request is an HTTP request.
4. Communication system according to any of claims 1-3, characterized in that said bearer capability is appended to the information request in a WAP Gateway or HTTP proxy prior to it is conveyed to the application server.
5. Communication system according to claim 4, characterized in that the WAP gateway or HTTP proxy is connected between the access bearer and the application server.
6. Communication system according to any of claims 1-3, characterized in that the bearer capability is appended to the information request in the terminal.
7. Communication system according to claim 6, characterized in that the bearer capability is appended to a WSP information request when using WAP.
8. Communication system according to any of claims 6 or 7, characterized in that the terminal comprises a Radio Access Module adapted to collect information regarding used access bearer.

9. Communication system according to any preceding claim,
characterized in that the capability of the access bearer is appended in
an HTTP header of the HTTP request.
- 5 10. Communication system according to any preceding claim,
characterized in that the capability of the access bearer is appended in
a WAP header of a WAP request.
11. Communication system according to any preceding claim,
10 characterized in that the bearer capability includes parameters
regarding the transmission speed used by that access bearer.
12. Communication system according to any preceding claim,
characterized in that the application server is adapted to tailor the
15 accessed information content depending on the capability of the bearer that is
used for the specific access.
13. Method in a communication system comprising a terminal (2), e.g. a mobile
phone, adapted to access information in an application server by using an
20 information request conveyed to said application server via an access bearer
having a bearer capability, characterized in that the following steps are
performed in response of an information request initiated at said terminal:
A appending the capability of the used access bearer to the information
request, and
25 B applying the information request, including the access bearer capability, to
the application server.
14. Method in a communication system according to claim 13
characterized in that the following step is performed after step B:
30 C tailoring the requested information content depending on the capability of
said used bearer.

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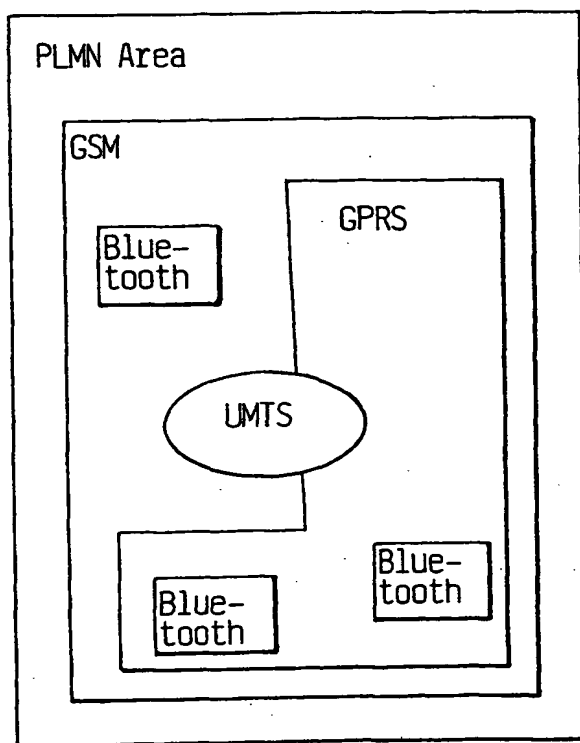
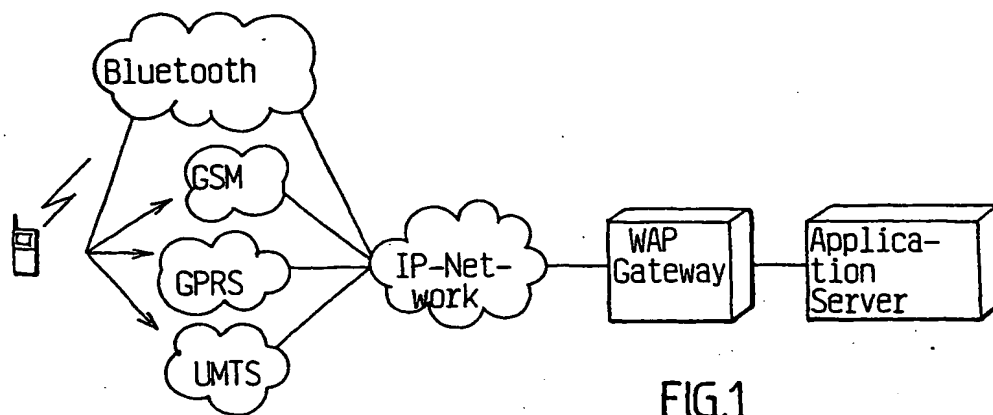


FIG. 2

2 / 2

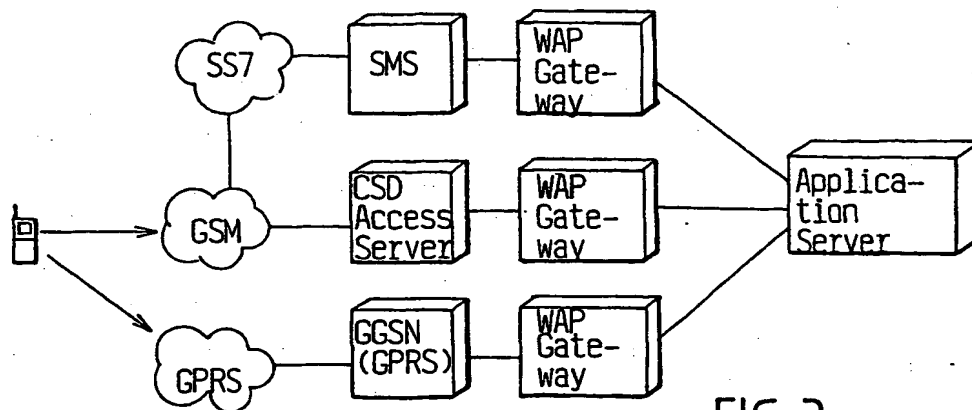


FIG. 3

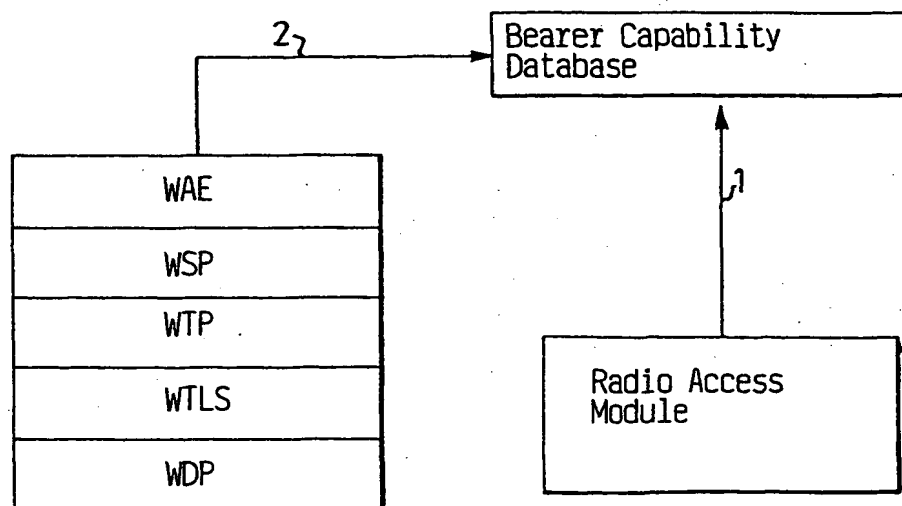


FIG. 4

SUBSTITUTE SHEET (RULE 26)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/01564

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/22, H04Q 7/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9956431 A2 (NOKIA MOBILE PHONES LTD), 4 November 1999 (04.11.99), page 1, line 5 - page 9, line 10, abstract --	1-14
A	WO 9535002 A1 (QUALCOMM INCORPORATED), 21 December 1995 (21.12.95), page 2, line 25 - page 5, line 5, abstract --	1-14
E,A	WO 0135689 A1 (NOKIA NETWORKS OY), 17 May 2001 (17.05.01), page 4, line 10 - page 7, line 30, abstract -- -----	1-14

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
WO	9956431	A2	04/11/99	AU	4360999 A	16/11/99
				BR	9910049 A	02/01/01
				CN	1307775 T	08/08/01
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